WATER DISPENSER

This application claims priority to U.S. provisional application, Ser. No. 60/133,352, filed May 10, 1999, for WATER PURIFIER AND DISPENSER, by Al E. Meder and Jeff L. Bell, which is hereby incorporated herein by reference.

BACKGROUND OF THE INVENTION

This invention relates generally to water dispensers for dispensing drinking water, such as treated or distilled water and, more particularly, to a water dispenser which distills or otherwise purifies or treats untreated water and dispenses substantially treated or distilled water. This invention also relates to an advertising method which provides display panels at the water dispenser.

Many business and home settings today include a water cooler or dispenser for providing a user with treated water. Typically, these dispensers include a base unit, which supports a replaceable water bottle, which is initially filled with treated water. The water bottle is installed with an opening through a lower end such that water flows down into a cup or container when a valve beneath the water bottle is opened. While these dispensers provide users with more or less a cup of purified or spring water, the water bottles are of a specific limited capacity and thus require periodic manual replacement or refilling. Accordingly, a person must remove the empty water bottle and replace it with a full bottle, typically by turning the full bottle upside down and quickly placing it over top of the dispensing unit in order to prevent the water from spilling out onto the floor. Such a process is both time consuming and cumbersome for a person to have to perform on a substantially regular basis. Additionally, the requirement of replacing the empty bottle with a full one also leads to an additional requirement of a storage area to hold the empty and full bottles, and on occasion, a person to manage the program and ensure that the bottles have sufficient water in them to feed into the dispenser at all times. Because the pure water for the replaceable containers must be purchased with the containers, which themselves may or may not become lost or broken, the implementation and use of such a dispensing unit may also be costly over a prolonged period of time.

Other water dispensers have been proposed which do not include a water bottle at the upper portion but bring treated water from a remote location. However, such a system may or

may not further require the addition of a pump within the water line in order to propel the water upwards into the reservoir of the dispenser.

Water dispensers are often placed in hallways or break rooms of businesses where they are easily accessible by the employees or visitors of the business. While it is known to provide an adhesive type advertisement on such a dispenser, such advertisements typically relate to the water dispenser itself or to the purified or distilled water being dispensed therefrom. Additionally, such advertisements may not be effective due to the low visibility of the advertisement on the water cooler and may not be durable and may become dislodged from the water dispenser over time.

SUMMARY OF THE INVENTION

The present invention is intended to provide a water dispensing unit for dispensing treated water. The dispensing unit may be a distillation unit and may be a stackable unit which stacks a condenser, a holding tank and at least one nozzle over a boiling unit for distilling the water. The dispensing unit may include one or more advertisement or display panels at one or more side and/or front panels of the unit housing.

According to a first aspect of the present invention, a water dispensing unit is adapted to receive water from a water supply and dispense drinking water to a user of the unit. The water dispensing unit comprises at least one dispensing nozzle for dispensing treated water from the water supply, a housing which substantially encases the water dispensing unit, and one or more displays which are operable to display a message to the user. The housing has a forward surface and a pair of opposite side surfaces. The dispensing nozzle is positioned at a forward surface of the housing. The display is positioned at the forward and/or side surfaces of the housing. Preferably, the housing includes an illumination source which is operable to provide illumination to the display. The display may comprise a semi-transparent panel and/or a video monitor, such as a television screen or a computer monitor or the like, and may further comprise an audio device which is operable to communicate an audible message in addition to the visual message.

In one form, the water dispensing unit further comprises a water treatment unit such that the unit may receive non-treated water from the water supply and the water treatment unit is operable to treat the non-treated water and provide treated water to a user via the dispensing nozzle. The water treatment unit may comprise a water distillation unit or a water purification unit, such as a carbon filter and/or a ceramic filter, reverse osmosis or the like. Alternately, the

water supply may comprise a bottle of treated water positionable at an upper end of the dispensing unit, such that the treated water is supplied to the user via the dispensing nozzle.

According to another aspect of the present invention, a method for advertising comprises the steps of providing a water dispensing unit, providing at least one advertising display at the housing of the dispensing unit, and placing the dispensing unit at a targeted location. The advertising display is operable to convey an advertising message for a product or service to a user of the water dispensing unit. Preferably, the targeted location is also associated with the product or service being advertised. The advertising display may comprise a panel at the housing and may comprise a semi-transparent backlit display. Alternately, the advertising display may comprise a television screen or computer monitor, which may be remotely controllable to alter or adjust the display from a remote location.

According to yet another aspect of the present invention, a water distillation and dispensing unit is provided for receiving untreated water and dispensing treated water and comprises a treatment unit including a boiling unit, a holding tank, and a dispensing module, which includes at least one dispensing nozzle for dispensing treated water. The boiling unit includes a heat source which is operable to provide heat to the untreated water and is positioned at a first level of the distillation and dispensing unit. The holding tank is positioned at a second level above the boiling unit and above the dispensing nozzle. The boiling unit is operable to generate steam, which condenses to a liquid condensate and accumulates in the holding tank before being dispensed therefrom by the dispensing nozzle. Preferably, the dispensing nozzle is positioned above the boiling unit. An advertising display or panel is preferably positioned at one or more surfaces of a housing of the dispensing unit. The housing may further include an illumination source for providing illumination to the display panel.

A steam tube is interconnected between the boiling unit and the holding tank such that the steam is communicated upwardly through the steam tube. Preferably, a condensing unit is positioned between the steam tube and an inlet to the holding tank and generally above the holding tank. The condensing unit receives the steam generated by the boiling unit and causes the steam to condense to a liquid condensate. The liquid condensate then enters the holding tank and accumulates therein.

Preferably, the dispensing module includes three dispensing nozzles. A first dispensing nozzle is interconnected with the holding tank such that tepid water is dispensable therethrough. A second dispensing nozzle is interconnected with a cooling unit such that cold water may be dispensed therethrough. A refrigeration unit is included between the holding tank and the second

dispensing nozzle in order to cool the water before dispensing the water through the nozzle. A third dispensing nozzle is interconnected with a heater unit such that hot water may be dispensed therethrough.

Therefore, the present invention provides a water dispensing unit which provides an advertisement display at an outer housing of the unit. The display may be illuminated and may be varied to enhance its effectiveness. Preferably, the dispensing unit is a water distillation and dispensing unit which has a stackable orientation of its components, such that a boiling unit is positioned at a lower end of the dispensing unit, with a condensing unit, holding tank and dispensing module positioned above the boiling unit. Preferably, the dispensing module is positioned below the holding tank and between the boiling unit and holding tank. The condensing unit may then be positioned above the holding tank to further separate the condensing portion of the distillation and dispensing unit from the boiling unit.

These and other objects, advantages, purposes and features of this invention will become apparent upon review of the following specification in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front perspective view of a water dispenser in accordance with the present invention;

FIG. 2 is a front perspective view of another water dispenser in accordance with the present invention;

FIG. 3 is a front perspective view of yet another water dispenser in accordance with the present invention;

FIG. 4 is a perspective view of a water distillation and dispensing unit according to the present invention with the housing removed;

FIG. 5 is a partial sectional view along the line V-V in FIG. 4;

FIG. 6 is a rear view of the water dispenser of FIG. 1;

FIG. 7 is a schematic of the electronic circuitry associated with the water distillation and dispensing unit of the present invention;

FIG. 8 is a flow chart of the controls associated with a holding tank useful with the present invention; and

FIG. 9 is a flow chart of the controls associated with a boiling tank useful with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now specifically to the drawings and the illustrative embodiments depicted therein, there is shown in FIG. 1 a water distillation and dispensing unit 10 for providing substantially treated or distilled water through at least one dispensing valve or nozzle 12. At least one display or advertisement panel 88 is provided at a front 92a and/or sides 92b of a housing 92 of dispensing unit 10. The display 88 may be backlit or otherwise illuminated to enhance visibility of display 88 and thus enhance the effectiveness of any advertisement and/or message on display 88. Preferably, display 88 provides an advertisement to promote other products and/or services which are independent of the dispensing unit and the water being dispensed therefrom. Preferably, the promotional display promotes goods or services related to the targeted location or environment at which the dispensing unit 10 is positioned, such that potential consumers of the advertised goods/services will have the opportunity to view the advertisement as they get themselves a drink of water from dispensing unit 10.

As shown in FIG. 4, water distillation and dispensing unit 10 preferably includes a boiling unit 14 positioned in a lower portion of water distillation and dispensing unit 10, a steam tube 16, a condensing unit 18 positioned at an upper portion of water distillation and dispensing unit 10, a holding tank 20 positioned generally beneath condensing unit 18, and a dispensing module or unit 13, which includes dispensing nozzles 12. Steam tube 16 is interconnected between boiling unit 14 and condensing unit 18 such that steam generated by boiling unit 14 rises upwardly through steam tube 16 and condenses within condensing unit 18 to a liquid form of distilled water. The water flows from condensing unit 18 into holding tank 20, where it may be dispensed through one or more dispensing nozzles 12, which are positioned generally below holding tank 20. A control circuit 15 is preferably included to activate and deactivate boiling unit 14 and a fan 46 associated with condensing unit 18 in response to detected water levels within holding tank 20 and/or boiling unit 14, as discussed below.

Referring to FIGS. 1 and 6, water distillation and dispensing unit 10 is preferably encased within housing 92, which includes front panel 92a, two side panels 92b, a rear panel 92c and a top panel 92d. Housing 92 is preferably formed on a substantially square or rectangular base 22, such that boiling unit 14 and holding tank 20 may be substantially cube-shaped, thereby being capable of holding a larger volume of water than conventional cylindrical containers requiring a similar amount of floor space. Front panel 92a includes a recessed portion 94 in which are positioned dispensing nozzles 12a, 12b and/or 12c, which preferably dispense cold water, room temperature water and hot water, respectively. Recess portion 94 extends below

dispensing nozzles 12 to provide space for a container, receptacle or glass to be placed under nozzles 12 as water is dispensed therefrom, and includes a drip pan 94a beneath nozzles 12 for catching water that may drip from the dispensers 12 and/or the container.

Rear panel 92c of housing 92 is shown in FIG. 6 and may include a pair of openings near its upper end for connection of a filter 44, which may be a carbon post filter or the like, between an outlet end 18d of condensing unit 18 and an inlet opening 20a of holding tank 20. This allows for easy removal and replacement of filter 44, without having to open housing 92. A condensing coil 64 for a cooling unit 50 may be positioned along a middle portion of rear panel 92c and interconnected with a plurality of fins 64a in order to dissipate heat from the condensing coil 64 as discussed below. A plurality of electrical connectors 96 are preferably accessible through openings in rear panel 92c for connection of the electrical components of water dispensing unit 10.

As shown in FIG. 1, a substantially fixed advertisement panel or display 88 may be included above dispensing nozzles 12 on front panel 92a and/or side panels 92b, and may provide a panel for decorative purposes and/or for advertising. Preferably, display 88 is backlit by an illumination source 86 (FIG. 7) which is controlled by control unit 15. Display 88 may be large enough to include an effective display or advertisement due to the large holding tank 20 and corresponding large outer surface of water distillation and dispensing unit 10, as compared to the prior art water bottle coolers and dispensers. However, as shown in FIGS. 2 and 3, one or more displays 88 may be positioned at a front and/or side surface of other water dispensing units, such as a bottled water dispenser 10' (FIG. 2) and/or a water dispenser 10'' (FIG. 3), which dispenses purified or distilled water. The dispenser may receive purified or distilled water from a remote source or may receive untreated water and purify the water via carbon filters or ceramic filters or any other known means for water treatment. The dispensers thus may provide purified, distilled or tap water via a remote source or a replaceable water tank or bottle, and may be operable to dispense the treated water in various temperatures as selected by the consumer. For example, the water may be dispensed through multiple dispensing nozzles at room temperature, chilled or heated temperature. Alternately, the water may be dispensed at either room temperature or chilled temperature, or may be dispensed at room temperature or heated temperature, or even at a heated temperature or a chilled or cold temperature. Because water dispenser 10'' does not include a boiling unit and condenser, or a water bottle, the dispenser may have a shorter height than the other units, such that a display 88' may additionally or alternately be positioned at an upper surface 92d' of the unit.

Display 88 may be part of the front or side panels 92a and 92b of the dispensing unit or may be a separate, removable and replaceable panel mounted at the side and/or front panels. Preferably, display 88 is a semi-transparent plastic display panel. Preferably, the semi-transparent display is backlit to enhance its visibility and effectiveness via illumination source 86 positioned within housing 92 of the water dispenser. Clearly, however, display 88 may comprise other materials and/or may be otherwise illuminated or not illuminated, without affecting the scope of the present invention. Display 88 may be single panel at one or more sides of the dispensing unit or may comprise a wraparound display, which provides a substantially continuous display around the sides and front of the unit. Additionally, display 88 may be manually or automatically changeable to alternatingly or intermittently display two or more distinct messages. For example, the display panel may be removable and replaceable at the housing of the water dispenser. Alternately, the display may comprise a plurality of movable panels which may rotate, slide or otherwise move to expose a different side of the panels to a viewer of the display, thus intermittently providing different displays or advertisements at the dispenser. Such display panels are implemented in various billboards and thus known in the field of billboards and signs.

It is further envisioned that display 88 may comprise a video monitor or screen, such as a television screen, computer monitor, or any other screen, monitor or the like, which is operable to display a continuous advertising message, such as a pre-recorded message on a video tape, or disk or other data storage means. The display may be operable to change the advertising message periodically or in response to an electrical signal. For example, a control 88a (FIG. 7) of the display may be programmable to periodically change or modify the display message. The display may also be adjustable in response to various inputs, such as a certain time of the day or week. It is further envisioned that these displays or monitors may be remotely controllable to allow the advertising messages to be changed periodically from a remote location. For example, an operator of the advertising display may be able to alter or change the message being viewed on the monitor via an internet connection or the like. Alternately, the control 88a may be connected to a receiver 88b or the like which receives a signal from the remote location and communicates a corresponding electronic signal to the control.

Alternately, or additionally, the display may include an audio device, which is operable to convey an audible message to a user of the dispensing unit. The audio message may be associated with the display message or may provide additional information relative to the water dispenser, targeted location of the dispenser, and/or the advertised products and/or services. The

audible message may be a continuous message or may be a message which is activated in response to a consumer actuating one of the dispensing nozzles to get a drink from the dispensing unit. For example, the audio message may thank a person getting a drink for shopping at the targeted location or store where the dispensing unit is located, or for visiting the targeted office, and may further remind them to shop or visit the business or location in the near future.

The display may be continuously illuminated or otherwise operable when the water dispensing unit is activated or may be activated for a period of time following an electrical signal, which may be triggered via a manual activation of the display or a movement or actuation of one of the dispensing nozzles. For example, control 88a may be operable to detect use of the dispensing unit by a consumer and trigger activation of the message/display and/or illumination source in response thereto. Additionally, an audio message, as discussed above, may also or otherwise be triggered in response to such detection. The control may be further operable to deactivate the illumination source, display and/or audio message a period of time following activation.

Preferably, display 88 is associated with a product or service independent from the dispensing unit or the water being dispensed therefrom. Most preferably, the product or service being advertised on display 88 is associated with the targeted location at which the dispensing unit is placed. For example, an advertisement for various banking services may be provided by display 88 on a dispensing unit placed in a lobby of a bank, such that customers walking into the bank who stop to get a drink can see the advertising message at the dispenser. Alternately, the display may convey an advertising message associated with a prescription or non-prescription drug or other medical product. The dispenser may then be placed at a doctor's office, medical clinic, hospital, or the like, such that when a person stops to get a drink of water, they are exposed to an advertisement associated with a product or service associated with the business or office which they are currently visiting. The dispenser may be placed at any location where there is a high likelihood for use or viewing of the unit by potential consumers of the product or service being advertised. The dispenser may be placed in conference rooms, meeting rooms, warehouses, factories, and/or any other location selected by the product/service sponsor, dispenser installer or customer. This provides highly effective advertising, since the consumers are being exposed to the advertisement at a time and place where they are in the vicinity of and/or in view of the product/service being advertised, and thus most likely to be interested in the message being conveyed and to be able to act in response thereto.

Because the advertising displays are positioned at a housing of a water dispenser, the displays may be placed at targeted locations, such as reception areas of offices or the like, where the business or office may otherwise not wish to have an advertisement placed. In order to further enhance the desirability of placing such a unit with an advertising display at an office, it is further envisioned that an advertising method would provide an advertising display, which is associated with a product or service, at a targeted location which is also associated with the advertisement product or service. The advertising panel, or right to advertise on the dispensing unit, may be purchased by an advertiser of the product or service in order to sponsor the advertiser's specific products or services. Because the sponsor then pays for the advertising, the dispensing unit may be placed at targeted locations of interest to the advertiser, with no additional installation and service charges to the targeted location or organization, such as a doctor's office, bank or the like. The advertiser may be independent from the targeted location or business, such as a prescription or non-prescription drug company which provides an advertisement at a doctor's office, clinic, hospital or the like. Alternately, the advertiser may be associated with or directly related to the targeted business or location, such as a bank which advertises their banking services in the lobby of a branch of the bank. The targeted account or location may be contacted by the advertiser, or by the provider of the water dispenser, or by any other related party, to get approval on the concept prior to placing the water dispenser at the targeted location.

Accordingly, the advertising method provides benefits to all parties involved. The advertiser is provided with an optimal advertising location in an area which experiences generally high traffic of potentially interested or motivated consumers. The location or target organization also benefits by having a water dispenser placed at their office, reception area or the like with minimal or no charge to the organization. The water dispenser provider also benefits via compensation for the installation and servicing, which is provided by the advertiser via the purchase of the advertising space. Additionally, the user or consumer also benefits by having free drinking water available at the target location, and by having the opportunity to view the advertising message displayed at the dispensing unit.

The advertising display may be implemented at the housing of any water dispenser for dispensing drinking water to a user thereof. The dispensing unit may receive treated or untreated water from a supply source and may be operable to treat and/or dispense the water to a user of the dispenser. The treatment system associated with the dispensing unit may comprise a carbon filtration system, a ceramic filtration system, a reverse osmosis system, or any other

known distillation or purification systems or processes, without affecting the scope of the present invention.

As best shown in FIGS. 4 and 5, water dispensing unit 10 preferably comprises a water treatment system 11 for purifying or distilling untreated water from a water supply source. Preferably, water treatment system 11 is a distillation system, and comprises a boiling unit 14, condensing unit 18, and a holding tank 20. Preferably, water dispensing unit 10 is generally cube or box-shaped to provide a greater volume of water holding tanks over a bottle unit or the like, while requiring a substantially similar amount of floor space.

Preferably, boiling unit 14 is substantially cube-shaped and rests on or near a bottom or lower panel 22 of water distillation and dispensing unit 10. Boiling unit 14 includes a steam outlet opening 14a which may be interconnected to a lower end 16a of steam tube 16 via a S-curved connector 24 or the like. Clearly, however, boiling unit 14 may be alternately shaped and/or connect directly to steam tube 16, without affecting the scope of the present invention. A water inlet opening 14b may also be provided in one of the front, rear or side walls 14c of boiling unit 14, and preferably near an upper end thereof. A water supply line 26, which includes a shut-off valve 36, is connected to water inlet opening 14b so as to provide untreated water to boiling unit 14. Preferably, boiling unit 14 provides a large vessel for holding a substantially high volume of untreated water. This high volume capacity allows distillation and dispensing unit 10 to be very tolerant of changes in feed water or supply water conditions. Additionally, an access opening 14d may be formed in an upper surface 14e of boiling unit 14 to provide access to boiling unit 14 for maintenance or repairs. Access opening 14d is preferably covered by a lid 28 to prevent steam from escaping therethrough when water distillation and dispensing unit 10 is in use. Preferably, boiling unit 14 is easily removable from distillation and dispensing unit 10 in order to facilitate serviceability of boiling unit 14.

Boiling unit 14 includes a heating element 30 positioned within boiling unit 14 for providing heat to the water contained within boiling unit 14, such that steam may be generated by boiling unit 14. The heating element 30 may be a submersible electronic heating coil or the like and is preferably positioned within boiling unit 14 along a lower portion or bottom surface 14f thereof. However, other methods of providing heat to boiling unit 14, such as a gas heater, a propane heater or the like, may be implemented without affecting the scope of the present invention. Preferably, a thermostat or overheat switch 80 (FIG. 7) is interconnected with heating element 30 and functions to sense the temperature of heating element 30. When the temperature exceeds a predetermined amount, the overheat switch 80 opens a circuit to deactivate heating

element 30, in order to prevent overheating of heating element 30 in situations where the water level has dropped below at least a portion of heating element 30 in boiling unit 14. Similarly, a fan switch 82 is operable to sense a temperature of a fan motor 46a and may open a circuit to deactivate fan motor 46a when the motor exceeds a predetermined shutoff temperature. An element protection microswitch 32 may also be interconnected with overheat switch 80 and fan switch 82 for deactivating heating element 30 and fan 46 in response to overheating of heating element 30 and fan motor 46a, respectively. By providing an additional overheat switch, the present invention substantially reduces the possibility of excessive overheating of heating element 30, since both switches 32 and 80 would have to fail before water distillation and dispensing unit 10 would be operable when heating element 30 may overheat.

A water level float switch 34 may also be included in boiling unit 14 and positioned substantially above heating element 30 and near upper surface 14e of boiling unit 14. Water level float switch 34 is similar to a conventional float switch and includes a float 34a attached to an end of a lever arm 34b, such that as the water level rises and lowers within boiling unit 14, the float 34a causes the lever arm 34b to pivot to open and close a circuit. Water level switch 34 may be interconnected with a solenoid shut-off valve 36 positioned along supply line 26, such that when the water level drops to a predetermined level within boiling unit 14, solenoid valve 36 may be opened to allow additional untreated water to flow into boiling unit 14 through supply line 26 until the elevation of the float switch shuts off solenoid 36.

Steam tube 16 extends substantially vertically upwardly from connector 24 at lower end 16a to an upper connector 40 at an upper end 16b of steam tube 16. Upper connector 40 interconnects upper end 16b of steam tube 16 to an inlet end 18a of condensing unit 18. Steam tube 16 is preferably a substantially cylindrical tube having a substantially uniform diameter passageway therethrough. Preferably, steam tube 16 is encased in a foam insulating tube 42 or other forms of insulation to contain heat around tube 16, thereby reducing cooling of the tube 16 during use. This substantially reduces or precludes the steam, which rises upwardly through tube 16, from condensing along an interior surface of tube 16. Preferably, steam tube 16 extends vertically through openings 93a, 95a and 97a in platforms or shelves 93, 95 and 97, respectively. Openings 93a, 95a and 97a are preferably formed in a rearward corner portion of the respective shelves or platforms, such that steam tube 16 is positioned along a rearward corner portion of water distillation and dispensing unit 10, although clearly other locations may be utilized without affecting the scope of the present invention.

Condensing unit 18 is preferably formed by a cylindrical tube 18b which may be wrapped or coiled in a substantially circular fashion and positioned above holding tank 20, although clearly other forms of condensing tubes or the like are included within the scope of the present invention. Condensing tube 18b has a passageway therethrough, which preferably has an inner diameter that is less than the inner diameter of the passageway through steam tube 16. Most preferably, the inner diameter of steam tube 16 is approximately 7/16 of an inch, while the inner diameter of condensing tube 18b is approximately 3/8 of an inch. This variance between the diameters slows the velocity of the steam which is rising upwardly through steam tube 16 when water distillation and dispensing unit 10 is in use, which improves the purity of the water condensing in condensing unit 18 by reducing the total dissolved solids or tds in the treated water. Alternately, steam tube 16 may include an upper portion and a lower portion, where the upper portion has an inner passageway of a given diameter, which is less than the diameter of the lower portion. It has been found that the used of a dual-diameter steam riser significantly reduces the tds of the condensate, which improves the purity of the condensate forming in condensing unit 18.

Condensing unit 18 also includes a plurality of fins or rings 18c connected to and extending radially outwardly from condensing tube 18b, in order to facilitate dissipation of the heat from the steam entering condensing unit 18, thereby cooling condensing tube 18b and thus condensing the steam therewithin into a liquid condensate. A lower, outlet end 18d of condensing unit 18 provides an outlet for the treated water condensed from the steam and is interconnected to an inlet opening 20a at an upper portion of holding tank 20. Preferably, a carbon block post filter 44 may be included in line between outlet end 18d of condensing unit 18 and inlet opening 20a of holding tank 20. The filter 44 may be positioned along rear panel 92c of dispensing unit 10 to allow for easy replacement of the filter, without having to open the housing of the dispenser. A motorized fan 46, or other means to facilitate cooling of the condensing coils, is also preferably included in the vicinity of condensing unit 18 to enhance circulation of the air surrounding condensing unit 18.

Holding tank 20 is preferably substantially cube-shaped and includes inlet-opening 20a formed in a rear panel 20b of holding tank 20. Preferably, holding tank 20 provides a high volume tank or vessel capable of storing, for example, approximately eight to ten gallons of distilled water. Holding tank 20 is supported by upper platform 95, which includes a passageway 95b therethrough corresponding to an outlet opening 20c of holding tank 20. Outlet opening 20c is formed through a bottom panel 20d of holding tank 20 and is interconnected to

dispensing module 13 such that the distilled water may be provided to a user by at least one of the dispenser nozzles 12.

Holding tank 20 further includes an upper water level or shut-off float switch 56 positioned at an upper portion of holding tank 20 in order to provide a shut-off signal to heating element 30 and fan 46 when the water level within holding tank 20 reaches a predetermined upper level. Shut-off float switch 56 includes a float 56a and a lever arm 56b, similar to float switch 34 within boiling unit 18. A medium level or startup float switch 58 may also be included in order to provide a signal which activates heating element 30 and fan 46 when the water level within holding tank 20 drops to a predetermined low level. Startup switch 58 is positioned within holding tank 20 at a level substantially beneath shut-off switch 56, and also includes a float 58a connected to a lever arm 58b. Although shown and described with an upper level switch 56 and a lower level switch 58, clearly holding tank 20 may include no switch or a single two-way switch, without affecting the scope of the present invention. Alternatively, conductivity sensing probes may be used to sense the level of water in holding tanks 20, as disclosed in commonly assigned U.S. Pat. No. 4,975,154, the disclosure of which is hereby incorporated herein by reference. An access opening 20f may be formed in an upper surface 20g of holding tank 20 in order to provide access to the float switches for maintenance as may be required over a prolonged period of use. Access opening 20f is preferably covered with a seal member or cover 60 in order to prevent any airborne bacteria from entering into holding tank 20.

Dispensing module or unit 13 includes at least one dispensing nozzle 12 and is removably positioned below holding tank 20. Dispensing unit 13 is preferably commercially available as an assembled unit, such as those manufactured and marketed by Sunroc Corporation of Dover, Delaware. Dispensing unit 13 may be installed in water distillation and dispensing unit 10 by interconnecting one or more openings in holding tank 20 with one or more nozzles 12 in dispensing unit 13. Preferably, dispensing unit 13 includes a cooling unit 50, which is interconnected with outlet opening 20c of holding tank 20, and cools the water in order to provide cold water through a cold water dispensing nozzle 12a. A sealing unit 54 is preferably provided within the passageway 95b to connect holding tank 20 to cooling unit 50 and prevent any leakage of water and/or air therebetween. More preferably, a second outlet opening 20e may also be provided in holding tank 20 to provide room temperature water to another dispensing nozzle 12b via a connecting tube 52.

Cooling unit 50 may be included in dispensing unit 13 and is preferably a substantially cylindrical container which is connected to outlet 20c in holding tank 20 at an upper end thereof

and is preferably positioned on a middle platform or shelf 97 of dispensing unit 13. Sealing unit 54 substantially seals the upper end of cooling unit 50, such that an airlock is formed between holding tank 20 and cooling unit 50, which substantially reduces or precludes airborne bacteria from entering into cooling unit 50. Water that flows downward into cooling unit 50 is cooled by a refrigeration unit, preferably a conventional unit comprising a compressor 62, condenser coil 64 and an expansion valve and evaporator (not shown) within cooling unit 50 to absorb heat from the distilled water contained therein. An outlet is formed at a bottom portion of cooling unit 50 and is interconnected to cold water dispensing nozzle 12a via a cold water tube 66.

Preferably, dispensing unit 13 includes a third nozzle 12c and a heating unit 68, such that a second outlet 50c may be formed in cooling unit 50 to provide water to heating unit 68 via a tube 70. Alternately, water may be provided to heating unit 68 directly from holding tank 20. Heating unit 68 is preferably a substantially cylindrical container having a heating element 72 (FIG. 5) therein. An outlet opening 68a is formed in a side of heating unit 68 and is interconnected with the third dispensing nozzle 12c via a hot water tube 74, in order to provide heated or hot water to a user of water distillation and dispensing unit 10.

In an alternate embodiment, an additional float valve (not shown) may be provided within cooling unit 50 of dispensing unit 13, such that cooling unit 50 is separated from holding tank 20. Sealing unit 54 may then include a solenoid valve or the like, which opens and closes in response to a signal from the additional float valve in cooling unit 50 such that water flows from holding tank 20 into cooling unit 50 only when the water level in cooling unit 50 drops to a predetermined level. This further precludes contaminants from entering cooling unit 50, while also maintaining the cool water therein at a substantially lower temperature than the water contained within holding tank 20, since the two containers are not connected and the higher temperature water in holding tank 20 thus cannot mix with the lower temperature water in cooling unit 50.

Electrical circuit or control 15 is preferably included in water distillation and dispensing unit 10 to control fan motor 46a, heating element 30 and solenoid valve 36, in response to signals from the switches 32, 34, 56 and 58. A display control 88a may also or otherwise control an illumination source for display 88 and/or may control the display itself, such as by activating, deactivating and/or changing the display and/or the display message or the like. The electrical controls or circuitry, as best shown in FIG. 7, are operable to activate or control the fan motor 46a, heating element 30 and valve 36, and include a relay contact 78 which opens and closes in response to one or both of the float switches 56 and 58 in holding tank 20, thereby

connecting or disconnecting power to boiling unit 14. In particular, as long as switch 56 is open due to sufficient water in holding tank 20, relay contact 78 is off and boiling unit 14 is de-energized. When water begins to drop, switch 56 is closed but switch 58 remains open until the level of water in holding tank 20 drops to a particular level. At that point switch 58 also closes, which activates relay contact 78, thereby energizing boiling unit 14. As the distillation process begins to again fill holding tank 20, switch 58 will open. However, a latch formed by the contact of relay 78 in parallel with switch 58 will keep boiling unit 14 operational until the rising water level opens switch 58. Although boiling unit 14 and holding tank 20 are shown and described as including one or more mechanical float switches or controls, clearly the scope of the present invention includes a boiling unit and/or holding tank which includes electronic controls such as sensing probes or the like. It is also envisioned that the scope of the present invention includes other means for controlling boiling units and/or condensing fans which may be useful with the present invention.

As best shown in FIG. 7, element protection switch 32 is preferably interconnected with thermostat or overheat switch 80 for deactivating heating element 30 in response to overheating thereof and fan switch 82 for similarly activating and deactivating the fan motor 46a. An outlet 84 for providing power to compressor 62 of cooling unit 50, if applicable, and lights 86 for providing illumination to dispensing nozzles 12 and/or for providing illumination to semi-transparent display panel 88 on a front or side portion of the water distillation and dispensing unit, may also be interconnected with electrical circuit 15.

Preferably, holding tank 20 and boiling unit 14 are formed from a stainless steel material or the like, which allows for steam sterilization of water distillation and dispensing unit 10. Boiling unit 14 may be activated while fan 46 is deactivated in order to reduce condensation of the steam which rises upwardly into condensing unit 18. This allows the steam that is generated by boiling unit 14 to be communicated through boiling tank 14, upward through steam tube 16, through condensing tube 18b and into tank 20, thereby sterilizing the inner surfaces of each component. Steam may be further provided through cooling unit 50 and dispensing nozzles 12 of dispensing module 13 to similarly sterilize dispensing module 13. Optionally, an UV light may be provided within holding tank 20 to provide additional biological protection of the distilled water contained in holding tank 20. Preferably, water distillation and dispensing unit 10 provides for steam sterilization, ozonation, or UV sterilization of all of the surfaces, such as the holding tank, the cooling unit, and/or the heating unit, which come in contact with the treated, product water.

Water distillation and dispensing unit 10 is preferably a stackable unit, which allows the unit to treat and contain a substantial amount of water in boiling unit 14 and holding tank 20, without requiring a large amount of floor space. Furthermore, because of the orientation of the holding tank 20 above dispensing nozzles 12a, 12b and/or 12c, cold, room temperature and/or hot water may be dispensed from water distillation and dispensing unit 10 without requiring pumps or other pressurized water supply. This configuration allows gravitational forces to flow the water downward to dispensing nozzles 12. An additional benefit of this stackable orientation is that it allows dispensing module 13 to be positioned between boiling unit 14 and holding tank 20 such that they are substantially separated from one another. This provides for improved purity in the distilled water in holding tank 20, since water droplet carryover is substantially reduced by the long steam tube 16. Although boiling unit 14, holding tank 20, electrical circuit 15 and dispensing module 13 may all be contained within housing 92, preferably each of these may be easily removed therefrom to facilitate maintenance of these components as may be necessary.

During use, when the water level of holding tank 20 is below its predetermined lower level, heating element 30 and fan motor 46a may be activated by electronic circuit 15 in response to a signal from lower float switch 58. If additional water is required in boiling unit 14, solenoid 36 is opened to allow water from supply line 26 to enter into boiling unit 14. Heating element 30 then provides heat to the water, which subsequently generates steam as the water heats and eventually begins to boil. The steam rises upwardly through outlet 14a in boiling unit 14 and into steam tube 16 via connector 24. The steam then rises upwardly through steam tube 16 and into inlet 18a of condensing unit 18. As the steam cools within the condensing tube 18b, distilled water is formed therein, which then flows through the condensing coils to outlet 18d of condensing unit 18. Fan 46 may be activated to circulate the air surrounding condensing unit 18 in order to facilitate cooling of the coils, and thus to enhance condensing of the steam within condensing unit 18. Preferably, side panels 92b, rear panel 92c and top panel 92d of housing 92 include slots therethrough to further facilitate air movement around condensing unit 18. The distilled water preferably flows from condensing unit 18 through carbon post filter 44 prior to entering holding tank 20 through inlet opening 20a. The distilled and preferably filtered water then accumulates within holding tank 20 until it reaches its predetermined upper limit, whereby upper float switch 56 opens the circuit to deactivate heating element 30 and fan motor 46a. This process is continued when the water level again drops within holding tank 20 as water is dispensed from dispensing nozzles 12.

As the water accumulates within holding tank 20, water flows downwardly through sealing unit 54 within passageway 95b in platform 95 and into cooling unit 50. Cooling unit 50 may then function to cool the water contained therein such that cold water may be dispensed through cold water nozzle 12a. A portion of the water contained within cooling unit 50 also may flow through tube 70 and into heating unit 68, where the water is then heated to a substantially high temperature. This water then may be dispensed through hot water dispensing nozzle 12c. The third dispensing nozzle 12b preferably is included to provide room temperature water from holding tank 20 which has not been heated or cooled by heating tank 68 or cooling unit 50, respectively. Because holding tank 20, which is kept supplied with treated water from the distillation process, is positioned substantially above dispensing nozzles 12a, 12b and 12c, no pump is required to dispense water from the nozzles 12, since the water flows to the nozzles, which preferably include a conventional valve and lever apparatus for opening and closing each nozzle, due to gravitational forces alone.

Referring now to FIG. 8, a process 100 for opening and closing the relay contact 78 is shown which starts at 110 when power is applied to water distillation and dispensing unit 10. If it is determined at 120 that the water level within holding tank 20 is at an upper limit, the relay contact 78 is opened at 130. If the water level is not at its upper limit at 120, then it is determined at 140 whether the water level is at a lower level limit. If it is determined at 140 that the water level is at its lower limit, then the relay contact 78 is closed at 150 to provide power to boiling unit 14. If, on the other hand, the water level in holding tank 20 is not at its lower level, the boiler remains de-energized and the process continues at 110.

A process 200 is shown in FIG. 9 which starts at 210 and activates and/or deactivates the heater and fan in response to both the status of the relay contact 78 and the output of switches 32 and 34 in boiling unit 14. If it is determined at 220 that the relay contact 78 is not closed, then no power is supplied to switches 32 and 34, such that heater 30 and fan 46 are deactivated at 230 and a close or shut-off signal is sent to the water solenoid 36 at 240. The process then continues at 210. If it is determined at 220 that relay contact 78 is closed, then it is then determined at 250 whether the water level within boiling unit 14 is below a predetermined operating level. This is determined by water level switch 34, which, as discussed above, closes the circuit to solenoid valve 36 in response to the water level in boiling unit 14 dropping to a predetermined level. If the water within boiling unit 14 is below the operating level at 250, then water solenoid 36 is opened at 255 and it is then determined at 260 whether element protection switch 32 and/or overheat switch 80 and fan switch 82 are closed. If it is determined at 250 that the water level in

boiling unit 14 is not at or below its lower limit, it is also determined at 260 whether element protection switch 32 and switches 80 and 82 are closed, without first opening solenoid valve 36. If it is determined at 260 that one or more of the switches 32, 80 and 82 are not closed, which may result from overheating of heating element 30, then heating element 30 and fan motor 46a are deactivated at 280 and the process continues at 210. If, on the other hand, it is determined at 260 that all of the switches 32, 80 and 82 are closed, then heating element 30 and fan motor 46a are activated at 270 to generate steam in boiling unit 14 and thus provide water to holding tank 20. The process then continues at 210.

Therefore, the present invention provides a means for dispensing treated water without also requiring the manual processes of changing and replacing water bottles. This further avoids the need for storing an extra supply of water bottles for replacement as the previous water bottle is emptied. Manual intervention may be further reduced by providing the float switches within the tanks, which control the supply of water to the water distillation and dispensing unit and the activation or deactivation of the unit. The water distillation and dispensing unit of the present invention may further allow for steam sterilization of the tanks and tubes associated therewith, thereby further reducing the need for manual intervention.

Furthermore, by positioning the holding tank, which is generally filled with treated water, at an upper portion of the water distillation and dispensing unit above the dispensing nozzles, no pumps are required to communicate the treated water to the nozzles since the water flows down to the nozzles due to gravitational forces alone. The stackable orientation of the tanks and dispensers also provides for maximum utilization of space since a large volume of water may be treated and stored in the unit while the unit requires a relatively small amount of floor space.

An additional benefit of water distillation and dispensing unit 10 is that the heavily insulated and substantially long steam tube provides improved purity of the distilled water which is accumulated in the holding tank. By separating the boiling unit from the condensing coil, there is less carryover of the water droplets in the steam, which results in a greater purity of water that is accumulated in the holding tank. The purity level is further improved by including a steam rising tube which has a passageway with an inner diameter which is preferably larger than an inner diameter of the passageway within the condensing tube. This functions to slow the velocity of the steam within the steam tube, which subsequently lessens the amount of impurities being pulled up the riser tube. Additionally, a carbon post filter may be included at the water

distillation and dispensing unit, such that filtered and distilled hot, cold and/or room temperature water may be dispensed through the dispensing nozzles.

Additionally, by eliminating the need for a bottle of water to be easily accessible at an upper end of the unit, one or more semi-transparent decorative or advertising panels or displays may be included on the water distillation and dispensing unit because periodic access to the area above the dispensing nozzles is no longer required. The displays may also be placed on bottled water dispensers and/or at other types of water purifiers and/or dispensers. The displays may further be illuminated by lights within the housing to improve the appearance and effectiveness of the advertisements. The advertising displays may be changeable and/or may comprise a viewing screen or monitor and/or may include an audible message associated with the advertisement. The advertising space on the water dispensing unit may be sold to product or service sponsors and the unit may then be placed at areas associated with the product or service to enhance the effectiveness of the advertisement. The dispensing unit may be placed at the targeted locations with no additional charge to the location or business at that location, since the distillation unit provider is compensated via the sales of advertising space on the unit.

Changes and modifications in the specifically described embodiments can be carried out without departing from the principles of the invention, which is intended to be limited only by the scope of the appended claims, as interpreted according to the principles of patent law.